# PATENT COOPERATION TREATY

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DUE DATE
20/11/05
ENTERED

# PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

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|---|---|
| Date of mailing *(day/month/year)* | 21 December 2004 (21.12.2004) |
| Applicant's or agent's file reference: FP2080 | FOR FURTHER ACTION: See paragraph 2 below |
| International application No.: PCT/SG 2004/000022 | International filing date *(day/month/year)*: 20 January 2004 (20.01.2004) |
| | Priority Date *(day/month/year)*: ---------- |
| International Patent Classification (IPC) or both national classification and IPC: H04B 7/04, H04L 27/02 | |
| Applicant: AGENCY FOR SCIENCE, TECHNOLOGY AND RESEARCH | |

1. This opinion contains indications relating to the following items:

- [x] Cont. No. I — Basis of the opinion
- [ ] Cont. No. II — Priority
- [ ] Cont. No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Cont. No. IV — Lack of unity of invention
- [x] Cont. No. V — Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Cont. No. VI — Certain documents cited
- [ ] Cont. No. VII — Certain defects in the international application
- [ ] Cont. No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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## Continuation No. I

### Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed.

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## Continuation No. V

### Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

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|---|---|---|
| Novelty (N) | Claims **----** | **YES** |
| | Claims **1-35** | **NO** |
| Inventive step (IS) | Claims **----** | **YES** |
| | Claims **1-35** | **NO** |
| Industrial applicability (IA) | Claims **1-35** | **YES** |
| | Claims **----** | **NO** |

2. Citations and explanations:

Cited documents are:

D1: Won Namgoon, 'Channelized digital receivers for impulse radio.' In: ICC '03. IEEE International Conference on Communications 2003, Volume: 4, 11-15 May 2003 Pages: 2884 - 2888
D2: US 2003/0202801 A1
D3: US 2003/0227890 A1

Document D1 provides a channelized digital receiver for impulse radio (IR). Critical to the design of a digital IR receiver is the ability of the analog-to-digital converter (ADC) to efficiently sample and digitize the received signal at the signal Nyquist rate of several gigahertz. Since designing a single ADC to operate at such frequencies is not practical, channelized receivers that efficiently sample at a fraction of the signal Nyquist rate are presented. Their performances are compared in the presence of phase noise/sampling jitter and narrowband interference. Analysis suggests that channelizing the received signal in the frequency domain results in consistently higher performance than channelizing in the time domain. Furthermore, in the presence of moderate sampling jitter/phase noise, high resolution ADC's are not needed.

Document D2 provides a method and apparatus for information modulation for impulse radios presented in both single-tone and pulse stream configurations. The modulation techniques include combinations of amplitude and phase modulation. The modulation techniques include both digital and analog schemes, including baseband on/off keying modulation, wavelet on/off keying modulation, pulse-position modulation, and FM modulation. Techniques for varying the modulation rate are also provided. Additionally, harmonics impulse ratio configurations are presented to take advantage of the modulation techniques.

Document D3 provides a system and method for analog signal generation and manipulation in an ultra-wideband (UWB) transmitter. A preferred embodiment comprises a digital portion of an UWB transmitter, which is responsible for encoding a data stream to be transmitted, and an analog portion. The analog portion creates a stream of short duration pulses from the encoded data stream and then filters the stream of short duration pulses. To simplify the generation of the short duration pulses, a quantized representation of the short duration pulse is used. The quantized representation is created via the use of control signals that by coupling differential amplifiers together, generate a voltage drop across a resistor and hence, a current.

The present application provides a method as well as a transceiver system for transmitting data as a pulsed ultra-wideband (UWB) signal comprising a serial-to-parallel converter to produce a parallel representation of the input signal followed by a modulator to produce a stream of impulse trains. In the next step, two or more of the impulses are delayed in a way that afterwards all of these pulses are within a single pulse repetition cycle of the modulated stream of impulse trains. Then a new, combined signal is formed out of the delayed pulses. The final step is a pulse generation in order to be able to transmit the signal over a UWB antenna. The receiving step is analogue in reversed order.

Each of the cited documents show transceiver systems comprising converter, spreader, modulator or pulse generator part as in the present application. Therefore, these parts are well known. Further, the present application uses a delay unit in order to time-interleave the pulse stream and combine the result to a new signal. However, this feature can be found in D1, where interleaving is used to enable a practical usage of lower bandwidth ADC. Furthermore, document D1 shows the usage of matched filters in the same way as provided in the present application. Digital signal processing cannot be found in document D1 but this is well known state of the art.

Accordingly, all claims 1 to 35 are not new and do not contain an inventive step.

Industrial applicability is given.

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